

1 MAKING ROADS THAT ARE MORE SUSTAINABLE, WITH LOWER EMISSIONS AND THAT USE FEWER NATURAL RESOURCES

The "5th Generation Road" project essentially aims to preserve natural resources, keep pollution to the minimum, particularly noise pollution, due to road traffic, and reduce expenditure on road network construction and maintenance. Thinking and designing a road with a low environmental impact comes with a few requirements. Its life cycle must be extended, it should remain quiet and consumes the minimum amount of non-renewable natural resources. Several research projects have been undergone in IFSTTAR to follow this path, some of which have already reached the demonstrator stage.

Long-life road surfacings

While today's pavement structures are designed to last 30 years, the life cycle of road surfacings is much shorter, about seven years when subjected to heavy traffic. Road repair works cause considerable disturbances to both users and residents and are also dangerous. The OECD "Long-Life Pavement" working group, to which IFSTTAR belongs, has been involved in a number of projects aimed at improving this situation. New mixes using epoxy asphalt have been developed and IFSTTAR has proposed a new material for ultra-strong wearing courses, a High Performance Cementitious Material (HPCM) with steel fibre reinforcement and chippings.

Contact: Ferhat Hammoum
(ITF/OECD/LLPS3 project)



▲ A dismounting-remounting test on Nantes Métropole's dismountable urban pavement demonstrator

Tackle down nuisance

In urban areas, digging trenches to access underground networks (water, gas, etc.) is one of the main causes of disruption. In association with the industry and local authorities (Nantes Métropole and Saint Aubin les Elbeufs), IFSTTAR developed the concept of dismountable urban pavement that uses prefabricated hexagonal concrete blocks. These removable blocks allow rapid access to networks, improve pavement's durability and can also be recycled. As they are prefabricated, the integration of new sets of characteristics seems possible (varied textures, porous, silent, or de-contaminating surfaces, or built-in sensors, etc.).

In parallel, research aiming at reducing vehicle rolling noise in urban areas made further progress. The objective is to have a better understanding of the role of pavement texture and the effect of air pumping in the tire-road contact area. It has resulted in the development of new pavement technologies¹.

Contacts: Thierry Sedran (modular road)
and **Michel Bérengier** (ODSurf project)

Preserve natural resources

Keeping the environmental impact of roads under control, during both construction phase and service life, is also a major concern of decision-makers. IFSTTAR is taking part in the European project LCE4ROADS, which aims to develop a European methodology for labelling roads with regard to their life cycle on the basis of their technical, environmental and socioeconomic performance. IFSTTAR is also researching into the possibility of using renewable materials and recycling products that can be re-used for the same purpose at the end of their service life.

“In order to reduce oil consumption, we need to find an efficient and reliable substitute for asphalt.”

This is an major issue, especially in France where 70,000km of roads are repaired each year.

IFSTTAR has an interest in micro-algae, which have been identified as a promising biomass to manufacture a biosourced binder. They have the advantage of not being in competition with foodstuffs and their production does not require arable land. Research is being conducted in the framework of the Algoroute scientific project which is co-financed by the Pays de la Loire Region.

Techniques for recycling asphalt mixes at the end of their service lives are currently quite advanced, but questions remain about their performance when they have been recycled several times. IFSTTAR is involved in the national MURE² project (Multirecycling of asphalt mixes) to tackle this question, in the context of the development of new manufacturing methods for warm mixes (foam and additives).

Contacts: Agnès Jullien (LCE4ROADS project), **Emmanuel Chailleux** (Algoroute project) et **Paul Marsac** (MURE project)

1. More information on low-noise pavements can be found in the section "How can we tackle urban noise?"
2. Read the article about the MURE project on [Enviscope.com](http://enviscope.com) (FR)

Further readings

OCDE/CEMT (2008) "Long-Life Surfaces for Busy Roads - Economic evaluation of long-life pavements. Phase II", OECD 77 2007 031 P1 / ISBN: 978-92-821-0158-2.
GITF/OECD (2014) "Long-Life Pavement Surfacing Field Trials - Phase III" Working Group on Long Life Pavements Surfacing, Final Report to be published.



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